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Annex: country-specific information

Information presented in this Annex was collected from the NRAs in February and March 2025.

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Table 1: Distribution system operators and distribution network development plans in the EU

	Number of DSOs			Exemptions from the preparation of a DNDP			Transposition of Directive EU 2019/944	Existence of DNDP(s)	High voltage operated by the DSO(s)?
	Total	Serving <100.000 customers or small isolated systems	DNDP-obliged	Condition for an exemption	Share of customers served by the exempted DSOs	Regulatory scrutiny over the planning of DNDP-exempted DSOs			
AT	118	106	15	<50.000 customers[1]	around 8%	NRA can request further information besides regular monitoring.	expected by 2025	yes (voluntarily in 2024)	yes, max 380 kV
BE	14 (1 in the Brussels, 8 in the Flemish, 5 in the Walloon region)	3 (all in the Walloon region)	14[2]	*exemption not applied*			yes	yes	yes (max 70 kV) in the Walloon region and no in the Brussels and Flemish regions
BG	4	1	4	*exemption not applied*			yes	no (first DNDPs expected in 2026) [3]	no
HR	1	0	1	*exemption not applicable*			yes	yes	no
CY	1	0	1	*exemption not applicable*			yes	yes	no
CZ	271		4	direct connection to a DSO[4]	around 1%	no scrutiny rights except NRA's monitoring	yes	yes[5]	yes, max 110 kV
DK	37	30	37	*exemption not applied*			yes	yes	99 kV

[1] The Directive (EU) 2019/944 has not yet been transposed into the national law, but it is likely that the threshold will be 50.000 customers.

[2] including 8 DSOs in the Flemish region that have a joint DNDP prepared (with annexes per DSOs)

[3] DSOs in Bulgaria currently do not yet draft DNDPs, but in the beginning of the regulatory period every three years, they develop plans for development of the networks and submit them together with the tariff applications. They also provide a report on the implementation of the previous 3-year period. In the tariff approval procedure, EWRC carries out consultations with the stakeholders.

[4] 3 out of the four DNDP-obliged DSOs serve more than 100.000 customers.

[5] The Czech NRA explains the existing DNDPs do not have officially set structure and requirements. Until March 2025, DSOs were obliged to prepare and annually publish the expected development of the distribution system for at least 5 years. Novelisation of the Energy Act entered into force in March 2025 and the NRA is now obliged to set the structure and requirements.

	Number of DSOs			Exemptions from the preparation of a DNDP			Transposition of Directive EU 2019/944	Existence of DNDP(s)	High voltage operated by the DSO(s)?
	Total	Serving <100.000 customers or small isolated systems	DNDP-obliged	Condition for an exemption	Share of customers served by the exempted DSOs	Regulatory scrutiny over the planning of DNDP-exempted DSOs			
EE	34	33	1	<100.000 customers	around 1 %[6]	no scrutiny rights except NRA's monitoring	yes	yes	yes, max 110 kV
FI	77	66	77	*exemption not applied*			yes	yes	yes, max 110 kV
FR	161	154	7	<100.000 customers		no scrutiny by the NRA	no	yes[7]	yes, max 50 kV AC and 75 kV in DC
DE	around 866[8]	around 784	around 82	<100.000 customers[9]	around 25%	NRA can request a report on the grid status and the implementation of a DNDP. It can specify the form content and type of submission of the report.	yes	yes	yes, max 110 kV
GR	1	0	1	*exemption not applied*			no, but planned	yes	yes
HU	6	0	6	*exemption not applied*			yes	yes	yes, max 132 KV
IT	114	103	11	<100.000 customers	below 2%	no NRA scrutiny	yes	yes	no
LV	10	9	1	<100.000 customers	0.73%	NRA carries out inspections to verify the legally required quality of their service.	yes	yes	no
LT	4	3	1	<100.000 customers	around 0.005%	Exempted DSOs submit investments for approval by the NRA.	yes	yes	yes, max 110 kV

[6] The share was estimated based on the data regarding the numbers of customers from 2023 and 2024.

[7] The French NRA explains the NRA has no authority over the development of the DNDP as the implementing decree has not yet been published. The largest DSO published a preliminary document in March 2023 outlining the main features of a future DNDP.

[8] The number provided applies for March 2024.

[9] There is a re-exception if the technically possible generation from the previous two years from onshore wind or solar energy installed at each DSOs' network is reduced by more than 3%. Exempted DSOs also take role in the planning process by participating in the regional planning which culminates in regional scenarios.

	Number of DSOs			Exemptions from the preparation of a DNDP			Transposition of Directive EU 2019/944	Existence of DNDP(s)	High voltage operated by the DSO(s)?
	Total	Serving <100.000 customers or small isolated systems	DNDP-obliged	Condition for an exemption	Share of customers served by the exempted DSOs	Regulatory scrutiny over the planning of DNDP-exempted DSOs			
LU	4	3	4	*exemption not applied*			yes	no (the first iteration of DNDPs expected in 2025)	yes, max 110 kV
MT	1	0	1	*exemption not applicable*			yes	yes	yes, max 220 kV
NL	6	3	6	*exemption not applied*			planned by 2026	yes	no
PL	189	184	189 [10]	*exemption not applied*			yes	yes	yes, max 110 kV
PT	13	12	1	operating only LV[11]	information not available to the NRA	no NRA scrutiny	yes	yes	yes, max 60 kV
RO	49	45	4	not holding the distribution service concession[12]	information not available to the NRA[13]	no NRA scrutiny	yes	yes, since 2023	yes, max 110 kV
SK	132	129	3	<100.000 customers	around 5%	These DSOs need to comply with quality standards that incentivise them to invest in the distribution system and they have an obligation to annually provide to the NRA evaluation of quality standards.	yes	yes	yes, max 110 kV
SI	1	0	1	*exemption not applicable*			yes	yes	yes, max 110 kV

[10] 189 DSOs are obliged to prepare a DNDP and 42 DSOs are obliged to agree the DNDP with the NRA, because they provide distribution services for more than 300 customers and for whom more than 150 GWh is delivered.

[11] The Portuguese NRA explains that each of these DSOs serves less than 100.000 customers.

[12] The Romanian NRA explains that each DSO that holds a distribution service concession serves more than 100.000 customers.

[13] The Romanian NRA explains the number of users served by non-concessionaire DSOs is insignificant in relation to the number of users serves by the DSOs holding a concession.

	Number of DSOs			Exemptions from the preparation of a DNDP			Transposition of Directive EU 2019/944	Existence of DNDP(s)	High voltage operated by the DSO(s)?
	Total	Serving <100.000 customers or small isolated systems	DNDP-obliged	Condition for an exemption	Share of customers served by the exempted DSOs	Regulatory scrutiny over the planning of DNDP-exempted DSOs			
ES	326[14]	320	326	*exemption not applied*			no[15]	yes	yes, max 150 kV
SE	166	160	166	*exemption not applied*			yes	yes	yes, max 220 kV

Table 2: Regulatory models

Regulatory model	Member States
Revenue cap	BE, BG, HR, CZ, DE, DK, ES, FI, LV, LU, PT (TOTEX), SE
Cost-plus / Rate of return	AT, CY, EE, FR, GR, MT
Price Cap	LT, RO, SK
Hybrid	HU (combination of cost-plus and revenue cap), IT, (rate of return on slow money, incentive regulation on fast money, including a fixed OPEX CAPEX share for expenditures after 1/1/2024), NL (combination of yard stick and price cap), PL (cost of service with elements of revenue cap and elements of quality regulation), SI (Methodology is based on the regulated network charge with the aim that by setting the network charge and other revenues, and taking into account identified deviations from previous years, the system operator should be able to cover all eligible costs in the regulatory period.)

[14] In 19 autonomous regions, 5 of them being isolated areas (Canary and Balearic islands, Ceuta and Melilla).

[15] Directive (EU) 2019/944 has been partially transposed in Spain, with certain terms incorporated into the regulatory framework. The provisions relevant to Article 32 of the Electricity Directive have not yet been transposed. The transposition competence lies with the Ministry, not the NRA.

Table 3: Regulatory scrutiny powers over distribution network development plans

	Member State
Approval power	the Flemish region in BE, CZ, CY, GR, HR, HU, LV, LT, NL, PL, RO, SI
Amendment power	EE, GR, SK
Power to request amendments	AT[16], the Flemish region in BE, the Walloon region in BE (evaluation consisting of reading, checking and commenting the text information and processing the data, including performance of different checks and analysis), CY, HR, EE, FI, DE, GR, HU, IT, LV, LT, LU, MT, NL, PT, RO, SI, SE (power to request amendments if the DSOs don't follow the regulation, but not to request amendments on the specific content of the DNDP)
Power to issue a non-binding act	the Brussels region in BE (NRA reviewing and providing remarks to the DSO and publishing and providing advice on the DNDP to the Government), CY, LU, PT
Other power	DE (to specify the form, content, and type of the DNDP and issue more detailed provisions with regard to the content and process), FI (power to give more detailed decree about what information should be provided in the D-NDPs, how the plan is delivered to the NRA and how the public hearing should be conducted), IT (to set minimum requirements for DNDPs), SI (power to specify minimum requirements)
No effective power	DK, FR (the NRA without the authority over development of DNDPs due to non-yet-published implementing decree), ES (19 autonomous regions endorse relevant DNDPs and the ministry is responsible for approving the economic development of these plans; the NRA has the duty to provide an individual and a global analysis for the whole sector to evaluate an economic impact of these investments in a way that ensures that they do not disturb the economic sustainability; the NRA is also responsible for the remuneration of the investments.)

Table 4: Harmonised content and structure of distribution network development plans on a national level

	Description
AT	A common template for DNDPs was provided by the NRA and it shall be legally binding upon the final implementation of the new electricity act. The template includes a common structure, description of required contents, templates for data tables, project descriptions etc.
BE	In the Brussels region, the regulation described the minimum content of the DNDP which consists also of detailed view of investments and projects, a status of the grids meaning a summary of the existing assets being part of it, description of asset management practices and policy including reporting of assets' rate of use in order to identify potential saturation and need for investments, scenarios for the evolution of the demand in the context of the energy transition and what the DSO plans in order to accommodate the expected evolution of the demand. In the Flemish region, a reporting model is published on the NRA's website which is based on the applicable legislation (https://www.vlaamsenutsregulator.be/nl/document/mede-2024-07). in the Walloon region, the NRA publishes yearly an updated guideline and associated appendix (worksheet template to be filled out).

[16] The Austrian NRA explains that as of May 2025, there is no legal obligation to publish DNDPs and the role of the NRA is not yet defined, however, the draft of the forthcoming law grants the NRA the right to request amendment of the DNDP.

	Description
BG	No common template, no harmonised structure or minimum set of information has been established for the DNDPs to comply with, but it is planned.
HR	Content of the DNDP is defined, but the structure not. The DNDP: • points out to all interested parties the main distribution infrastructure to be built or improved over the next ten years and initiates requests for the development of spatial plans; • contains all investments on which a decision has already been made and identifies new investments to be made; and • provides for an investment and completion timeline for all investment projects.
CY	No common template, no harmonised structure or minimum set of information has been established for the DNDPs to comply with.
CZ	No common template, no harmonised structure or minimum set of information has been established for the DNDPs to comply with, but it is planned.
DK	The Danish Energy Agency prepares a template for the DNDP to be used by every DSO.
EE	The Estonian Competition Authority has established guidelines specifying the minimum set of information to be included in the DNDP.
FI	Structure and content are set in the NRA decree. 1) Strategic forecast on the changes in the operating environment, 2) DNDPs basic information, 3) Life cycle cost comparisons, 4) Long-term plan, 5), Short-term plan in the upcoming 2 years, 6) Previous actions in the last 2 years, 7) Public consultation
FR	No common template, no harmonised structure or minimum set of information has been established for the DNDPs to comply with.
DE	There is no formal guidance regarding the structure of DNDP, but because DNDPs are based on a survey set by the NRA, it serves as a frame and leads to a similar structure. There are legal requirements that need to be met. Section 14d EnWG sets out the content, the procedure and the deadlines. The grid expansion plan shall contain the following information in particular: 1. Grid maps of the high-voltage and medium-voltage grid and the medium-voltage and low-voltage substations with the bottleneck regions of the respective grid, 2. Data on which the regional scenario prepared in accordance with paragraph 3 is based, 3. A description of the expected development of the distribution task up to 2045, including the measures likely to be required to optimize, reinforce, renew and expand the grid as well as necessary energy efficiency and demand-side management measures, 4. The planned optimization, reinforcement, renewal and expansion measures as well as necessary energy efficiency and demand-side management measures in the next five and ten years, stating the extent to which planning or approval procedures under public law are necessary for the implementation of these measures, as well as the respective status of these procedures and an indication of whether and when investment decisions have already been made by the electricity distribution system operator with regard to these measures and by when the electricity distribution system operator expects a measure to actually be implemented, 5. A detailed description of the bottlenecked line sections and the respective planned optimization, reinforcement and expansion measures, 6. The demand for non-frequency-bound ancillary services and flexibility services within the meaning of section 14c and the planned coverage of this demand, and 7. The extent to which use is to be made of the instrument of peak capping pursuant to section 11(2) of EnWG Summarizing, the DNDPs are generally harmonized.
GR	A common template describing the nature of each project, the estimated commissioning date, the stage the project is in (work in progress/completed/planned) and the total cost per year.
HU	DSOs have to include their proposed projects in 4 categories (investments identified during the analysis of earlier NDPs, investments generated by the concentrated grid user needs, other investments and investments identified in the previous NDP). There is also a dedicated chapter for substation upgrades and investments increasing network transmission capacity and improving network design.

	Description
IT	Minimum DNDP requirements are set out by the NRA decision 296/2023. A common harmonised structure, minimum set of information, template for project-specific information have been set out by NRA's decision 521/2024 following DSO's proposal. https://www.arera.it/atti-e-provvedimenti/dettaglio/521-24
LV	DSO plan shall be submitted in accordance with the regulation regarding the electricity DNDP which specifies the amount of information to be submitted. The sections to be included in the DNDP are defined in https://likumi.lv/ta/en/en/id/315072-regulations-regarding-the-electricity-distribution-system-development-plan.
LT	There is no specific template for the DNDP, but it must be in line with the orientations set out in the country's National Energy Independence Strategy. The DNDP is submitted in the context of the National Energy Independence Strategy, the TSO's NDP and other relevant legislation at national, regional and EU level. The DNDP shall be prepared in accordance with the envisaged implementation measures, including the objectives and/or targets for the development of smart grids and smart metering systems, the general principles for the regulation of the electricity sector, as well as the opportunities for network optimisation based on energy efficiency improvements in order to fulfil the priority principle for energy efficiency improvements as set out in the Law on Improving Energy Efficiency, and the necessary medium and/or long-term flexibility services.
LU	Non-binding guiding principles are being developed by the NRA with the content devoted to the scenario development, the planning methodology and criteria and portfolio of projects resulting from the application of scenarios. Recommended structural elements are composed of the framework, scope of the analysis, developments, structural trends and objectives of the plan, scenarios and reference data, methodology and criteria, project portfolio and results and sensitivity analysis.
MT	No common template, no harmonised structure or minimum set of information has been established for the DNDPs to comply with.
NL	A minimum set of information is set by the ministry regulation regarding the progress and realisation of the investments planned in the previous two years. As regards scenarios, an estimate regarding the production, import, export and supply of electricity or gas and an estimate of the required transport capacity for the total capacity requirement for the coming ten years.
PL	DNDPs have a financial module, investment module and the description part.
PT	Setting out requirements regarding the structure or content of the DNDP is under evaluation.
RO	No standardized template at national level, but the elements to be included are defined in detail within the NRA's regulation. The DNDP has to contain: • brief presentation of the national context in the field of electricity distribution, ongoing strategies and policies, the objectives and targets to which the investment projects in the 10-year development plan contribute; • investment works that are necessary in the high and medium voltage RED during the 10-year perspective period, following the analyses and studies developed, the time schedule of the investment projects, the total value and the estimate of the annual investment expenses for each investment project, highlighting the financing sources; • presentation of the changes in the list of investment projects compared to the previous edition of the 10-year development plan approved by ANRE, with the documented justification of each modified objective; • presentation of the stage of implementation of the investments included in the previous edition of the DNDP approved by ANRE, which includes the impact of delays or non-implementation of the investments included in the previous edition of the development plan, with a description, where applicable, of the technical implications that may significantly affect the operating parameters of the network and/or the influence on the implementation of other ongoing or planned investment projects; • presentation of the implementation status of the new obligations regarding the digitalization of the network, regarding flexibility services, integration of dispatchable consumption and distributed production from renewable sources; • investment needs identified during the consultation process of the OD implementation; and • presentation and argumentation of the way of correlating and complying the plan with the Energy Strategy of Romania and with the NECP.

	Description
SK	No standardized template for structure, but the content prescribed in the NRA's decree (https://www.slov-lex.sk/ezbierky/pravne-predpisy/SK/ZZ/2023/230/20250101.html).
SI	No standardized template for structure, but the content prescribed in the NRA's decree (https://pisrs.si/pregledPredpisa?id=AKT_1255). The NDP provides transparency on the medium- and long-term flexibility services needed and includes planned investments over the next 10 years, with a particular focus on the main distribution infrastructure needed to connect new generation capacity and new customers, including charging points for electric vehicles. The system development plan shall also include the use of demand response, energy efficiency, energy storage facilities or other resources used by the distribution operator as an alternative to system expansion, and an assessment of spare capacity for connecting additional distributed generation and energy storage based on a capacity analysis of the entire distribution network. In planning development, priority shall be given to measures to increase the energy efficiency of the existing electricity infrastructure through load balancing, demand response and the purchase of system services, whenever they are capable of reducing the need for new investment in network extensions or when they represent a more or equally cost-effective alternative to system expansion. In addition, the NDP must also be aligned with the National Energy and Climate Plan and provide information on the scale and financial value of the planned investments.
ES	Content and format of the DNDP was set out by the Secretary of State for Energy (https://www.boe.es/buscar/doc.php?id=BOE-A-2022-9577) following a non-binding proposal by the NRA.
SE	National legislation includes the minimum content and a template for DNDPs (https://ei.se/download/18.49940cc118cdf65e28e5eba/1705390180724/EIFS-2024-1-om-n%C3%A4tutvecklingsplaner.pdf). There are also non-binding guidelines.

Table 5: Monitoring of implementation of distribution network development plans

	Monitoring of implementation of DNDPs
Established	the Brussels region in BE (the NRA analysing the DNDP that includes detailed report on the investments made compared to the planned investment), the Flemish region in BE (verifying the percentage of executed investments compared to the planned), the Walloon region (DSO providing realisation status for projects and NRA monitoring the level of achievement of the planned projects), CY (monitoring of the progress within the next edition of the DNDP), DE (yearly monitoring by the NRA including detailed information on DSOs[17] and a right to request a report on grid status and the implementation of DNDP from the DSOs), DK (the Danish Energy Agency checking that all energy-related aspects in the plans meet an acceptable standard and the Danish Utility Regulator reviewing the plans to ensure meeting formal requirements and sufficient completeness), EE (by the DSO via periodic reporting and by the Estonian Competition Authority reviewing, approving and conducting random checks), FI (by the DSO by providing info on past development actions and by the NRA comparing the plan with the actions made), GR (by the DSO providing historical data for the year y-1 for each project and NRA monitoring costs of each project included in the development program and differences from the approved costs), HR, HU (by the DSO within the framework of the next DNDP and by the NRA when approving the plan and amending network companies' licences), IT (by the DSO via a publication and submission of the monitoring report to the NRA in years without DNDPs and within the DNDP in years when DNDPs are prepared, reports referring to e.g. project status and costs), LT (by the Council through the alignment of each year's investments; each investment project is technically and economically assessed), LV (DSO reporting to the NRA annually information needed for supervision of investments in the distribution system made in the previous year), LU, NL (by DSOs reviewing the previous DNDP and explaining in the DNDP the reasons for any deviations from the planned investments and deviations in a broader sense), PL (annually by DSO presenting information and NRA analysing it; potential discrepancies can result in a need to update the DNDP; if investments are not realised, it reduces the return on capital investments), PT (the NRA monitoring costs and time of execution), RO (DSO submitting annually to the NRA the status of the implementation of investments included in the previous edition of the DNDP, including estimates of the impact of delays or non-implementation of investments included in the previous edition of the DNDP and descriptions of technical implications that may significantly affect the operational parameters of the distribution networks and/or influence implementation of other ongoing planned investments), SK (DSO

[17] source: Monitoringbericht 2024, page 109

	Monitoring of implementation of DNDPs
	reporting within the next edition of the DNDP and submitting it to the NRA), SI (DSO reporting to the NRA annually on the implementation of its investment plan that must be aligned with DNDPs; physical volume and financial aspects are monitored, no actions is currently foreseen I in case of discrepancies), ES (the DSO providing the NRA with the necessary information for the supervision of investments in the distribution system on an annual basis and NRA evaluating the deviation in costs of investments made in the last three years, as compared to those planned in the DNDP, every semi-period, once every three years)
Planned to be established	AT, BG, CZ (NRA will monitor investment costs, commissioning dates and key indicators the investments are to improve), FR, SE (The NRA will monitor DSOs following the regulation.)
Not established and not planned	MT

Table 6: Legal nature of distribution network development plans

	Member States
All investments binding	The Walloon region in BE (DSO has to justify if projects are not realised as planned and NRA may impose realisation.), HR (DSO in its 10-year DNDP details investments for the next three-year and one-year period.), GR, NL, PL
Some investments binding and some indicative	The Brussels region in BE (projects indicative, but DSOs obliged to ensure security of supply), the Flemish region in BE, CZ, HU (an obligation to build for the first three years), PT (Most investments are indicative, but in case they are not executed, the DSO needs to provide a justification.), RO (The DSO is obliged to implement investments planned for the first 5 years. These investments are considered mandatory and are only subject to postponement or cancellation with well-founded and justified reasons that must be submitted to and accepted by the NRA.)
All investments indicative	AT, CY, DK, EE, DE (If the DSOs identify necessary expansion measures, those need to be implemented.), IT, LV, LT (Each project is coordinated with the NRA and direction of the DNDP is strictly adhered to, but specific projects are not always singled out.), LU, MT, SK, SI, ES, SE
Other	FI (Individual projects are not listed in DNDPs, but if the DSO does not follow the plan, the NRA can order to implement it., FR (no implementation decree)

Table 7: Frequency and publication of distribution network development plans and transparency of cost information

	Frequency of DNDPs	Publication of DNDP(s)	Transparency of cost information
AT	2 years	DSOs' websites and a common DSO website[18]	total investment costs available to the NRA (not public)

[18] https://www.ebutilities.at/informationen/VNEP

	Frequency of DNDPs	Publication of DNDP(s)	Transparency of cost information
BE	1 year in the Brussels and Walloon Regions, two years in the Flemish region	DSO's website[19] (all), NRA's website (the Flemish region)	foreseen costs of all or most investments available to the NRA (not public) in the Walloon region, foreseen costs of some investments available to the public in the Brussels region, only total investment costs available to the public in the Flemish region
BG	no DNDP yet		
HR	1 year	DSO's website	total investment costs available to the NRA (not public)
CY	2 years	DSO's website	foreseen costs of all or most investments are available to the NRA (not public)
CZ	2 years	DSOs' website	foreseen costs of some investments publicly available
DK	2 years	NRA's (Danish Utility Regulator's) website	total investment costs available to the NRA (not public)
EE	2 years	DSOs' websites and the Estonian Competition Authority's website	foreseen costs of all or most investments are available to the NRA (not public)
FI	2 years	DSOs' website	total investment costs publicly available (more detailed information available to the NRA)
FR[20]			total investment cost available to the public
DE	2 years	joint website VNBdigital.de	foreseen costs of most investments available to the public
GR	2 years	DSOs' and NRA's websites	foreseen costs of all investments publicly available
HU	1 year	no separate publication (integrated within TSO NDP)	total investment cost available to the public
IT	2 years	DSOs' websites	foreseen costs of some investments publicly available
LV	1 year	DSOs' website	foreseen costs of all or most investments publicly available (threshold provided in national law for provision of more detailed information)
LT	2 years	DSOs' websites	foreseen costs of some investments publicly available
LU	max 2 years	DSOs' websites	costs to be provided in the DNDP, but the level of granularity is yet unclear

[19] Starting with 2025, the NRA in Walloon region will publish the announcement in its newsletters including links to DNDPs.

[20] The French NRA explains the implementing decree has not yet been published. In parallel and in anticipation of this, the largest DSO published a preliminary document in March.

	Frequency of DNDPs	Publication of DNDP(s)	Transparency of cost information
MT	2 years	DSOs' websites	total investment cost available to the public
NL	2 years	DSOs' websites	total investment cost available to the public
PL	2 years	DSOs' websites	foreseen costs of all or most investments are available to the NRA (not public)
PT	5 years with reviews every 2 years	DSOs' website (but not all DSOs publish their DNDP)	foreseen costs of some investments publicly available
RO	2 years	DSOs' websites	foreseen costs of all or most investments are available to the NRA (not public)
SK	2 years	DSOs' and NRA's websites	foreseen costs of all or most investments are available to the NRA (not public)
SI	2 years	DSO's website	foreseen costs of all or most investments publicly available
ES	1 year	no publication[21]	foreseen costs of all or most investments are available to the NRA (not public), the total investment is public[22]
SE	2 years	DSOs' and NRA's websites[23]	no obligation for DSOs to include costs in the DNDP; DSOs provide their foreseen costs to the NRA for the purpose of the revenue cap regulation and this information is publicly available

Table 8: Consultation of distribution network development plans

	Consultation type	Who carries it out?	Time of the consultation	Consultation duration	Publication of consultation results
AT[24]	public	the DSO	draft DNDP consulted	around 4 weeks	information not yet available to the NRA
BE	public, for the Flemish region also	the DSO	draft DNDP consulted, for the Flemish region,	1 month for the Brussels and Walloon regions, 4-8 weeks for the Flemish region	comment and answers published in full for the Brussels and Flemish regions and no publication for the Walloon region

[21] The Spanish NRA explains the NRA publishes the total results of investments planned by each DSO provided by asset type in cases where specific analysis have been carried out.

[22] The Spanish NRA explains analysis and maximum investment value proposal reports sent to the Ministry are published on the CNMC website. The results can be viewed by asset type in cases where specific analyses have been carried out, and they are totalled by DSO in all cases. The Ministry officially publishes the total maximum investment value that it authorises for the DNPD, along with all the issues that may be relevant for such authorisation.

[23] The Swedish NRA explains it publishes the links to DNDPs on its website and will soon also publish it on a map service

[24] The Austrian NRA explains that information provided regarding consultation of DNDPs considers most likely provisions of the forthcoming electricity act. In the first round of DNDPs which were voluntary, there was no consultation.

	Consultation type	Who carries it out?	Time of the consultation	Consultation duration	Publication of consultation results
	targeted (stakeholders' meetings at the beginning of the preparation process and request for written feedbacks regarding scenarios and assumptions)		assumptions/scenarios also consulted at the beginning of the process		
BG	no DNDP yet	-	-	-	-
HR	public	the DSO and the NRA	before the start of the drafting (by the DSO) and before the approval (by the NRA)	15 days	comments and answers published in full
CY	public	the DSO	draft DNDP consulted	30 days	comments and answers published in full
CZ[25]	public	the DSO and the NRA	draft DNDP to be consulted	minimum 15 days	comments and answers to be published in full
DK	public and targeted (for some DNDPs)	some DNDPs consulted by the NRA and some by the DSO	draft DNDP consulted	around 1 month	comments and answers published in full
EE	public and targeted	the DSO	draft DNDP consulted	1 month by the DSO followed by 1 month by the National Competition Authority	comments and answers published in full
FI	public	the DSO	draft DNDP consulted	minimum 1 month	a summary of comments and answers
FR[26]					
DE	public and targeted[27]	the DSO	DNDP consulted	no predetermined period	comments and answers published

[25] The Czech NRA explains there was no obligation for DSOs to publicly consult DNDPs until March 2025. From that time on, they are obliged to consult the proposed DNDP before the submission to the NRA. Additionally, NRA is obliged to carry out the public consultation before its decision.

[26] The French NRA explains the implementation decree has not yet been published.

[27] DSOs must at least give grid users at medium and high voltage level and the TSO the opportunity to comment on the DNDP that affect them.

	Consultation type	Who carries it out?	Time of the consultation	Consultation duration	Publication of consultation results
GR	public	the DSO and the NRA	draft DNDP consulted	1 month	comments and answers published in full
HU	public and targeted	the DSO and the NRA	targeted consultation by the DSO before the approval of the end document of each of the four phases; the draft DNDP consulted publicly by the NRA	targeted around 1 month and public 1 month	a summary of comments and answers
IT	public	the DSO	draft DNDP consulted	at least 6 weeks	comments and answers published in full
LV	public	the NRA	draft DNDP consulted	1 month	comments and answers published in full
LT	public	the DSO	assumptions/scenarios consulted	about 1 month	comments and answers published in full
LU	public	the DSO	assumptions/scenarios and draft DNDP are consulted	at least 1 month according to the guidance principles, however, no legal provision on the duration and the first round of DNDP has not yet been carried out	comments and answers published in full (no legal provision on the granularity of the published results)
MT	targeted	the DSO	assumptions/scenarios and draft DNDP are consulted	8 weeks for assumptions/scenarios and 3 weeks for the draft	a summary of comments and answers
NL	public	the DSO	draft DNDP consulted	3 weeks	comments and answers published in full
PL	public	the DSO	draft DNDP consulted	21 days	comments and answers published in full
PT	public	the NRA	draft DNDP consulted	at least 30 working days	comments and summary report of public consultation together with NRA opinion published
RO	public	the DSO and the NRA	draft DNDP consulted	30 days by the DSO and 10 days by the NRA	comments and answers published in full
SK	public	the DSO	draft DNDP consulted	10 working days	comments and answers published in full
SI	public	the DSO	draft DNDP consulted	at least 30 days	comments and answers published in full
ES	no consultation				
SE	public	the DSO	draft DNDP consulted	6 weeks	comments and answers published in full for some DNDPs and summary of comments published for some DNDPs

Table 9: Coordination and alignment of distribution network development plans

	Individual or a joint network development plan?	Cooperation with other DSOs and/or with TSOs					
		Exchange on the data and/or assumptions regarding scenarios	Use of common scenario(s)	Exchange of the data regarding distributed generation, energy storage or demand response	Joint investigation of the need for additional grid capacity	Joint investigation of infrastructure investments	Additional explanation
AT	individual per DSO	with the TSO		with the TSO	with the TSO	with the TSO	
BE	the Brussels and Walloon regions: individual per DSO the Flemish region: one joint DNDP for 8 DSOs[28] (with some annexes per DSO)	with the TSO and other DSOs		the Walloon region: with the TSO and other DSOs	the Brussels and Walloon regions: with the TSO and other DSOs		For the Walloon region, the NRA is challenging the DSOs to go for a common set of forecast hypothesis. DNDP contains information regarding connection points load and coordinated work investment on these interfaces. There is a sector exchange of data regarding assumptions. Scenarios are built within each organisation considering their local situation and voltage level. For the Flemish region, the alignment of DSO and TSO plans in 2022-2023 was not as expected and it was raised by the NRA as an important point to be addressed in the next DNDPs that are being prepared in 2025 for both DSOs and regional TSO grid. The last regional TSO NDP was approved only conditionally, with a condition to better align the plan with the DSO for the next edition.
BG	Not applicable as there is no DNDP yet.						
HR	individual by the DSO				with the TSO	with the TSO	
CY	individual by the DSO	with the TSO		with the TSO	with the TSO	with the TSO	Areas of closer cooperation are the connection of large production facilities, storage applications, consumers with increased load and flexibility needs.
CZ	individual per DSO						
DK	individual per DSO	with the TSO and other DSOs		with the TSO and other DSOs	with the TSO and other DSOs		

[28] All DSOs work together under one company Fluvius. DSOs and TSO have to align on underlying assumptions of their plans, especially linked to the connection points of the DSOs to the TSO grids and the anticipated necessary investments.

	Individual or a joint network development plan?	Cooperation with other DSOs and/or with TSOs					
		Exchange on the data and/or assumptions regarding scenarios	Use of common scenario(s)	Exchange of the data regarding distributed generation, energy storage or demand response	Joint investigation of the need for additional grid capacity	Joint investigation of infrastructure investments	Additional explanation
EE	individual per DSO and a joint with the TSO	In addition to their separate DNDP and NDP, the TSO and DSO are working on a common network development plan. This collaboration ensures that both transmission and distribution network planning are aligned.					
FI	individual per DSO	with the TSO					DSOs are required to describe in their DNDPs how they consider and develop their connections to other DSOs and TSO. It is also required that the DSOs take into account scenarios presented in the TSO NDP, when doing their strategic forecast of the changes in the operating environment. DSOs are also required to consult the TSO about their DNDPs as part of the public consultation.
FR	individual per DSO						
DE	individual per DSO	with the TSO and other DSOs	with the TSO and other DSOs	with the TSO and other DSOs	with the TSO and other DSOs	with the TSO and other DSOs	All SOs are part of the planning process. The two-yearly process starts with the regional planning. Within a planning region, the DSOs must coordinate on the basis for their grid expansion planning. The TSOs must be involved in the creation of the regional scenario by law. Furthermore, the DSOs have to provide the TSOs with the possibility to comment on the DNDP.
GR	individual by the DSO					with the TSO	
HU	All DSOs and TSO prepare one joint network development plan. The DSO are participating in each of the 4 stages of its preparation process (data input, scenario development and selection, end state calculation for corner years, consideration of alternatives; the 4 end documents: development policies, natural behaviours, potential development strategies and network development plan of the Hungarian Power System). Strictly speaking for the final document, the DSOs have to include their suggested network development projects in 4 categories: (i) investments identified during the analysis of earlier NDPs, (ii) investments generated by concentrated grid user needs, (iii) other investments, (iv) investments identified in the NDP Y-1. Beyond that, there is a dedicated chapter for 'substation upgrades and investments increasing network transmission capacity and improving network design.						
IE							
IT	individual per DSO	with the TSO	with the TSO				Country-wide scenarios are prepared jointly by electricity and gas TSOs, in a process where DSOs are consulted. These scenarios are available in Q3 of the year before the plans. All DSOs preparing D-NDPs are required to prepare a document regarding criteria for distribution grids (due by November of the year before the D-NDP). DSOs are expected to implement the common scenarios including the local specificities as foreseen in the distribution criteria.

	Individual or a joint network development plan?	Cooperation with other DSOs and/or with TSOs					
		Exchange on the data and/or assumptions regarding scenarios	Use of common scenario(s)	Exchange of the data regarding distributed generation, energy storage or demand response	Joint investigation of the need for additional grid capacity	Joint investigation of infrastructure investments	Additional explanation
LV	individual per DSO	with the TSO					
LT	individual per DSO	with the TSO and other DSOs		with the TSO and other DSOs	with the TSO and other DSOs	with the TSO and other DSOs	DSOs and TSOs coordinate their plans in accordance with the requirements of the National Energy Independence Strategy.
LU	Information is not available to the NRA. It is to the discretion of each DSO. The first edition of DNDPs is expected in 2025.						The TSO is also the biggest DSO and their plans are well coordinated. The other DSOs are required by law to consult all relevant network users and the relevant extra-high voltage network operator about their network development plan.
MT	individual by the DSO						
NL	individual per DSO	with the TSO and other DSOs	with the TSO and other DSOs	with the TSO and other DSOs	with the TSO and other DSOs		The TSOs and DSOs jointly set up the scenarios. When they are defined, the TSO uses them to calculate the prognosed capacity needed. After this step the DSOs use the outcome for the capacity needs in their region. These outcomes go back to the TSO.
PL	individual per DSO	with the TSO and other DSOs	with the TSO	with the TSO	with the TSO and other DSOs	with the TSO	DSOs and TSOs use common network models for high voltage grid.
PT	individual per DSO	with the TSO	with the TSO	with the TSO	with the TSO	with the TSO	DSO and TSO share scenarios on demand and supply to coordinate studies and identify system needs including lack of capacity for injection or consumptions supply.
RO	individual per DSO			with the TSO and other DSOs	with the TSO and other DSOs	with the TSO and other DSOs	TSO and DSOs collaborate in carrying out network adequacy and impact studies, assessing the need for investments. Connection points between transmission and distribution networks are analysed to ensure stability and security of supply to consumers. TSO and DSOs coordinate investments to integrate renewable sources and modernize infrastructure. The need for the construction of new substations, the extension for some of high and medium voltage grids and the digitalization of the system are being

	Individual or a joint network development plan?	Cooperation with other DSOs and/or with TSOs					
		Exchange on the data and/or assumptions regarding scenarios	Use of common scenario(s)	Exchange of the data regarding distributed generation, energy storage or demand response	Joint investigation of the need for additional grid capacity	Joint investigation of infrastructure investments	Additional explanation
							analysed by DSOs and TSO. DSOs submit development plans to the TSO for consultation.
SK	individual per DSO	with the TSO and other DSOs		with the TSO and other DSOs	with the TSO and other DSOs	with the TSO and other DSOs	
SI	individual by the DSO	with the TSO		with the TSO	with the TSO	with the TSO	The planning of the development plans for the transmission and distribution systems is coordinated, as the TSO and DSO activities are carried out by a combined system operator.
ES	individual per DSO						
SE	individual per DSO						DSOs use different methods in their forecasting processes. There is a guideline for developing power forecasts, created by Energiforsk. Many DSOs have used this guideline to prepare their forecasts. The guideline (2024:1006) was developed in collaboration with some DSOs and published in 2024. It provides an overview of how a long-term power forecast can be created. Using the guideline, a theoretically aggregated maximum power demand can be derived based on factors such as historical load and production data, temperature dependency, and assumptions about additional power usage. Many DSOs have engaged in dialogue with municipalities and major customers in their network areas when developing their power forecasts. In addition, many have consulted with adjacent DSOs and/or TSO. Some DSOs have also engaged with other stakeholders. Moreover, many DSOs have considered municipal plans, as well as detailed municipal and energy plans, in their forecasting processes. Many have also taken national and regional plans into account.

Table 10: Time horizon of distribution network development plans

	Time horizon	Additional information related to the time horizon or the long-term planning
AT	5-10 years	
BE	the Brussels region: 5 years the Flemish region: 10 years the Wallon region: min 5 years	More detailed information is provided for the next three years and less detailed for the 10 years in Flemish region. In Wallonia, the time horizon is either 5 or 6 years.
BG	no DNDP yet	
HR	10 years	DSO has to provide detailed investments for the next 1- and 3-year period. In the last plan (2024 -33), there were two investments in 110/10(20) kV substations with planed investment start in year 2031 and planed investment ending in 2034 which is already out of the plan horizon.
CY	10 years	
CZ	5-10 years	
DK	10 years	
EE	10 years	The DSO provided detailed investments for the next 5-year period and less detailed for the 10-year period.
FI	10 years	In the DNDPs there are several different time horizons: • Strategic forecast for changes in the operating environment is done for the next ten years. • Long-term investment plans are done till the end of 2036 (Finnish regulation about security of supply obligations has to be met by the end of 2036). • Long-term investments due to new loads and production are described for the next ten years. • Appropriate life cycle cost comparisons for solutions used in the network development are done for a life cycle (50 years.) • Development actions (including investments, maintenance, etc.) for the next 2 years are described more detailed than the long-term plan. • Development actions done for the last 2 years are described same way as for the future 2 years.
FR[29]		
DE	5 years, 10 years, year 2045	Underlying Regional scenario: • The regional scenario consists of a development path that takes into account both the statutory targets set for the long-term target year 2045 and other climate and energy policy targets of the German government, as well as the likely developments over the next five and next 10 years. DNDP:

[29] The French NRA explains the implementing decree has not yet been published.

	Time horizon	Additional information related to the time horizon or the long-term planning
		• A description of the expected development of the distribution for the next 5 years, 10 years and up to 2045, including the measures likely to be required to optimise, reinforce, renew and expand the grid and the necessary energy efficiency and dm measures. • 2045 is the reference year and planning is required to serve the climate neutral policy goals. Those goals transfer to certain actions (e.g. installed RES capacity) which in turn can be transferred to energy flows and subsequently grid infrastructure. These calculations result in a very general output (e.g. required km of HV power line or the RES installed capacity). Although DSOs are required to use sophisticated data, methods and calculations, the 2045 scenarios is uncertain. • The +5 and +10 planning is more concrete; although certain actions (again e.g. RES installed capacity) still are projections, the foreseen need for infrastructure can and must be planned already in more detail (anticipatory of the upcoming developments). Thus, DSOs are not just required to report the overall expected developments, but identify concrete measures that enhance their grid capabilities. Therefore, the NRA has a list of all planned DSO grid enhancement measures. There is no further differentiation between the +5 and +10 horizon. DSOs are obliged to expand their grids in line with demand, therefore, DSOs have to proactively consider consumption and generation.
GR	5 years	
HU	15 years	There is a short term time horizon for projects to be realised within the next 3 years, then indicative system states for 5, 10 and 15 year horizons. Planning is done for a time horizon of 10 or 15 years and there is no penalty in case the “overbuilding” in justified.
IT	5 years	Network development scenarios go beyond the 5-year time horizon of the DNDP investments and some DSOs decide their major investments based on an analysis for the 10th year.
LV	10 years	Information regarding short-term projects (2-3 years) is more granular and very precise. Investment plans are approved for the 10-year period.
LT	10 years	Information regarding short-term projects (2-3 years) is more granular and very precise. DNDPs are approved for the 10-year time horizon.
LU	5-10 years	
MT	10 years	Projects scheduled within the next five years are described in greater detail, including their expected commissioning year. In contrast, projects planned beyond 2027 are primarily indicative, with only the major initiatives listed.
NL	10 years	In its network development plan, a grid operator provides a qualitative overview of expected expansions and replacements over the first ten years to mitigate anticipated risks, along with a quantitative breakdown of expansion and replacement investments planned for the first three years. So called “neighbourhood approach” is used meaning that the DSOs strengthen neighbourhoods one by one, even if the network is not fully utilised in the coming years. The aim is to prepare infrastructure for future needs and as a result, there is no need to reopen streets for reinforcements in the coming 10 to 20 years
PL	6 years	
PT	5 years	
RO	10 years	The level of granularity in the DNDPs differs between short-term and long-term projects. For short-term projects, the plans provide detailed information, including the exact names and codes of the projects, their locations (locality and county), and categorization by investment type. Each project also includes estimated costs and status, such as whether the design theme has been approved, a feasibility study completed, or an execution contract signed. In contrast, long-term projects are classified by categories of work, voltage level, and geographical area, and they undergo financial evaluation. This broader overview allows for strategic planning while maintaining a clear focus on immediate investment requirements.

	Time horizon	Additional information related to the time horizon or the long-term planning
SK	5 years	
SI	10 years	Financial scope of the planned investments for the short-term seems to be more realistic and aligned with realisation than for the long-term.
ES	3 years	The DNDP must be strategically planned so that the grid infrastructure is suitably prepared to meet future. The planned capacity of the networks must be sufficient to meet the natural growth of the network in the medium term (5-6 years) and all those needs to meet the expected requests identified in the short term (1-3 years). In essence, networks are designed with a certain margin of additional capacity, based on growth forecasts, due to the time and resource intensive nature of network construction. It is essential to be prepared for fluctuating needs without oversizing the system. In addition, we must consider the fact that DSOs with more than 100,000 customers assume all growth needs of smaller distributors (less than 100,000 customers) as natural network growth and should take this into account in their DNDP for the next 4-year horizon.
SE	10 years	There is no difference in granularity comparing short- and long-term planned projects.

Table 11: Scenarios of distribution system operators

	Scenario-based DNDP	Additional information	Public availability of scenario-related data	Number of scenarios	Level of granularity of scenario-related data	Alignment to TSO scenarios	Consideration of NECP
AT	yes	Federal political objectives are considered which do not necessarily comply with the national scenarios.	yes	1	provided for the whole DSO area	partial alignment with TSO's	yes (but not for all DNDPs)
BE	yes	In the Brussels region, the DSO consults on scenarios and assumptions are discussed with the NRA before the consultation. In the Flemish region, assumptions on relevant load and generation types are made (e.g. regarding electric vehicles, photovoltaics, heat pumps) and relevant stakeholders actively participate. These assumptions inputs for the network development calculation tool. In the Walloon region, scenarios approach is relatively new. Hypotheses are revised annually ahead of the DNDP and the scenario model is being continuously improved. Multiple sources of forecast studies are used and figures from the studies are offset with actual data from statistical organisation. The effort spent on the accuracy of scenarios is not equal among DSOs.	yes (the Brussels and Walloon regions)	1 with sensitivity analysis in the Brussels region, multiple in the Flemish region, 1 in the Walloon region	provided for the whole DSO area in the Brussels region, some data provided per regions and some for the whole DSO area in the Flemish region, provided for the whole DSO area in the Walloon region (with deployment of new behaviours foreseen considering a socio-economical classification of the local areas)	partial alignment with TSO's (in the Flemish region, a closer cooperation and alignment foreseen and expected; in the Wallon region, TSOs and DSOs communicate regarding scenarios with each other)	NECPs considered for the Brussels and Flemish regions and not for the Wallon region (but planned for the next editions of at least some DNDPs)

	Scenario-based DNDP	Additional information	Public availability of scenario-related data	Number of scenarios	Level of granularity of scenario-related data	Alignment to TSO scenarios	Consideration of NECP
BG	no DNDP yet						
HR	yes	DNDP must be aligned with strategic planning acts, documents and plans and in particular the national Strategy Development until 2030 with a view to 2050, valid integrated NECP, the national Strategy Spatial Development Plan and Spatial Plans, the Ten-Year Transmission Network Development Plan and with the methodology and criteria for planning the development of the network codes of the distribution system.	yes	1	provided per regions	full alignment with TSO's (assumptions duly aligned)	yes
CY	yes	The scenario examined is the extrapolation of historical data.	yes	1	provided for the whole DSO area	partial alignment with TSO's (a requirement for common projects, e.g. upgrade to 22 kV, new TSO substations to accommodate PV penetration)	yes
CZ	yes	The process is currently being developed.	yet unclear	yet unclear	yet unclear	yet unclear	yet unclear
DK	yes (not by all DSOs)			one for some and multiple for some DSOs	information not available to the NRA	no alignment	no obligation and information not available to the NRA
EE	yes	Scenarios are developed based on the DSO's internal data and analyses, complemented by external studies commissioned both by the DSO and the TSO.	yes	multiple	provided for the whole DSO area	partial alignment with TSO's	yes
FI	yes	DSOs are required to create a strategic forecast on changes to the operating environment for the next ten years. NRA has given guidelines what aspects needs to be considered in the forecast, such as national forecasts and goals, TSO NDP, plans and goals for electric charging points, etc. DSOs also	no	1		some alignment with TSO's (based on the NRA guideline)	yes

	Scenario-based DNDP	Additional information	Public availability of scenario-related data	Number of scenarios	Level of granularity of scenario-related data	Alignment to TSO scenarios	Consideration of NECP
		have to consider demographic development, changes in electricity consumption and production, etc. DSOs have to also describe what they have considered when creating the forecast and justify their decisions.					
FR[30]							
DE	yes	DSOs in a planning region shall, with the involvement of the TSO, draw up a regional scenario which forms the common basis for the respective grid expansion plans of the operators of electricity distribution grids in the planning region. The regional scenario consists of a development path that takes into account both the statutory and other climate and energy policy targets set by the German government for the long-term target year 2045 as well as the probable developments for the next five and ten years.	partial	1	provided per regions	alignment with scenarios of TSOs and other DSOs (an explicit requirement for DSOs to carry out bottom up analyses in addition to the top down approach, to recognize local specificities)	yes
GR	no	The planning of the DNDP is based on projects that the DSO deems necessary for the efficient operation and maintenance of the network.					yes
HU	yes		yes	multiple	provided for the whole DSO area	joint scenarios for all planning processes of DSOs and TSOs	yes
IT	yes	Some investments (especially HV/MV substations and their reinforcements) are scenario-based and some DSOs apply scenarios up to y+20. Some investments, especially in LV networks, are condition-dependant and do not follow mid-term planning or scenario-based approach.	yes	1	provided per regions	Country-wide scenarios are prepared jointly by electricity and gas TSOs and DSOs are	yes

[30] The French NRA explains the implementing decree has not yet been published.

	Scenario-based DNDP	Additional information	Public availability of scenario-related data	Number of scenarios	Level of granularity of scenario-related data	Alignment to TSO scenarios	Consideration of NECP
						consulted. DSOs are expected to implement common scenarios including local specificities as foreseen in the distribution criteria.	
LV	yes	System operators provide forecasted information about generation and demand.	no	1		TSO's scenarios considered	yes
LT	yes	Scenarios are prepared by the DSO and the public is not consulted on their preparation. Some scenarios are calculated on the basis of historical data from recent years. Other scenarios assume faster electrification. Scenario building is also closely linked to the National Energy Independence Strategy.	yes	multiple	provided for the whole DSO area	full alignment with the TSO's (assumptions duly aligned)	yes
LU	no DNDP yet	DNDPs are a new legal obligation imposed on DSOs and they are yet to publish their first DNDP. The NRA is currently in the process of formalizing the guiding principles (not mandatory) which advocate for the highest level of detail if available and relevant, however, these are of non-binding nature.	yet unclear	yet unclear	yet unclear	yet unclear	yes
MT	yes	Elements considered for the future scenario are outlined within the DNDP: the National Policy for the promotion of electric vehicles, decarbonization targets, and the development of renewables, energy storage, demand-side management and smart meters.	no	1	provided for the whole DSO area	no TSO	Information not available to the NRA (no such obligation)
NL	yes	The development of the IP2024 scenarios was an iterative process. Scenario and sector experts from the Dutch grid operators work together in a team, supported by external scenario and sector experts. This resulted in three scenarios that were further refined in an interactive process with stakeholders. Three sample years (2025, 2030 and 2035) are used in the scenarios.	yes	multiple	provided for the whole DSO area	full alignment with TSO's and other DSOs' (assumptions duly aligned)	yes

	Scenario-based DNDP	Additional information	Public availability of scenario-related data	Number of scenarios	Level of granularity of scenario-related data	Alignment to TSO scenarios	Consideration of NECP
PL	yes (not by all DSOs)	DNDPs of DSOs connected to the TSO's network use a scenario.	no			full alignment with TSO's and other DSOs' (legal obligation to coordinate on the plans)	yes
PT	yes	TSO and DSO use the same national climate and energy scenarios set by the Government, both on generation, load and H2 production or electrical vehicles.	yes	multiple	provided per regions	some alignment with TSO's	yes
RO	no	According to the NRA's Order No. 98/2022, DSOs prepares DNDPs based on studies and analyses regarding the age and technical condition of the network to establish the investment works necessary to improve the technical, qualitative, and commercial performance indicators of the network, studies and analyses for the integration of renewable sources, ensuring the reliability and security of the network, digitalization and integration of flexibility services, analyses of network operating regimes, analyses regarding the evolution of electricity production and consumption. DSOs consult NECP in the development of the DNDPs in order to align it with established national objectives and targets, which will also contribute to the achievement of EU objectives. While the DNDPs do not explicitly rely on scenarios in the traditional sense, the NECP plays a critical role in shaping the planning process. The NECP's projections for future energy generation and demand are integrated into the analyses and planning. This involves evaluating historical data and trends related to energy consumption and generation to inform the development of the DNDP.					yes
SK	yes	DSOs plan their development on the basis of the expected requirements of customers and potential customers, i.e. planned projects in their network.	yes	1	provided for the whole DSO area	some alignment with the TSO's	yes
SI	yes	Scenarios are mainly based on forecasts of electricity consumption and loads on the distribution network, separately for electrification of transport and electrification of heating and other consumption. Consumption and production forecasts are prepared for	yes	multiple	provided for the whole DSO area	some alignment with TSO's	yes

	Scenario-based DNDP	Additional information	Public availability of scenario-related data	Number of scenarios	Level of granularity of scenario-related data	Alignment to TSO scenarios	Consideration of NECP
		several scenarios, based on national development strategies and the scenario expected in the light of actual development dynamics.					
ES	yes	Autonomous Regions are responsible for the development of the distribution network and they must be aligned with the NECPs. Scenarios analysis and strategic direction of network development are matters of regional energy policy that fall within the competence of the Autonomous Regions and each region is responsible for defining its own energy policy, including the use of scenario planning.	Information not available to the NRA	Information not available to the NRA	Information not available to the NRA	Information not available to the NRA	yes[31]
SE	yes (not by all DSOs)			1 by some and multiple by some DSOs	the use of the same scenarios by some DSOs	use of the same scenario(s) by some DSOs	information not available to the NRA (no such obligation)

Table 12: Distribution systems operators' publication of information regarding connection requests (inside or outside their network development plans)

	Member States[32]
Number of network connection requests received during a specific period	CY, HR, NL (provided per voltage level), PT, RO (provided per voltage level), SI
Number of network connection requests approved during a specific period	AT (provided per voltage level and per size of the generation), the Walloon region in BE, HR, LT, NL (provided per voltage level), PL (list of connection investments)
Number of network connection requests denied during a specific period	HR, SI, ES[33]

[31] Autonomous Regions which are responsible for the development of the distribution network must be aligned with the NECPs.

[32] The Greek NRA explains that for RES applications, detailed information is presented on DSO's website.

[33] The Spanish NRA explains DSOs have an obligation to publish on their websites access requests for demand that have been denied. The data has not yet been released, as the NRA is preparing the formats so that the 326 DSOs can publish it in a harmonised way.

	Member States[32]
Visualisation of the DSO network related to the saturation of the grid	the Brussels region in BE (DNDP including diagram charts presenting forecasted levels of saturation of the supply points between higher and lower voltage levels and measured saturation level of some transformers and cables, no visualisation outside the DNDP yet), the Flemish region in BE (information provided per substations for TSO-DSO connection points and for substations od medium voltage level, capacity and measurements presented for both directions resulting in available capacity, a monthly update); the Walloon region in BE (presentation on a substation level for DSO/TSO substations, an update twice per year, current and future saturation provided), CY (an online hosting capacity map prepared by the TSO/DSO presenting the current saturation of transmission substation and information on the remaining available capacity for RES application; update every 6 months or earlier if required), FI (current capacity presented; un update required at least with the delivery of the new DNDP, but more regular updates recommended), DE (DNDP containing maps with marked market route measures and explicitly highlighted bottleneck-related measures; an update required every two years with new DNDP; heat maps shows future saturation 2045 and linkage to network measures; saturation with respect to connection request not explicitly named), IT (current hosting capacity presented by some DSOs referring to the MV sides of HV/MV substations; minimum frequency of the updates not yet defined), LV (indicative information on free capacity given at the substation level), SI (average nodal capacities for consumption and generation at MV/LV transformers; update required with every DNDP), ES (DSOs required to make the available nodal capacity at substation level, for voltage above 1 kV, available for generation and demand access requests; generation capacity already published, the formats for demand to be used to ensure homogenous information currently under preparation by the NRA)

Table 13: Distribution network planning methodologies

	How do DSOs determine where are investments needed?	Information on the planning methodology
AT	based on DSOs' experience and knowledge of their network	page 19-24 at https://www.ebutilities.at/api//files/oee-db-app/VNEP/Netzentwicklungsplan_Salzburg_Netz_2024.pdf
BE	based on the forecasted flows and voltage conditions	In the Brussels region, assets' age is reviewed and analysis of the quality of supply (mainly occurrence and duration of interruptions) and of saturation of the critical assets (transformers and cables) is carried out. When bottlenecks are identified, projects are planned in order to replace failing assets or to develop more capacity along with replacing assets reaching the end of the lifetime. For medium voltage grid, N-1 criterion is used for grid planning. In the Flemish region, a network development calculation tool is used and more specific investments from large customers are taken into account, resulting in amount of the necessary investments. Assumptions lead to scenario that are further on used within the simulation studies. Reliability criteria and N-1 are used as planning criteria. In the Walloon region, investment is a multifactor decision e.g. based on the current load, project-specific forecast, age of the asset.
BG	yet unknown because there is no DNDP in the country	
HR	based on the forecasted flows and voltage conditions	In the DNDP, DSO assumes the development of electricity production and consumption. When forecasting the load long term prediction of the load on the distribution system, historical data are viewed in correlation with different weather conditions and geographical location, as well as economic developments.

	How do DSOs determine where are investments needed?	Information on the planning methodology

		The long-term goal is to create a distribution network with only one medium voltage network level of 20 kV and one direct transformation of 110/20 kV. As part of measures for increasing energy efficiency, DSO is concentrated on measures for reducing losses in the distribution grid. Planning criteria for the distribution network are addressed through following main requirements: Voltage limits should be maintained, N-1 contingency criteria should be respected, electricity supply must be reliable and secure. In the planning stage it should also be insured that the following criteria are fulfilled:
		• normal rating capacity limits of the distribution equipment should be respected,
		• voltage drops as well as voltage fluctuations should be within permitted thresholds,
		• contingency and routine replacement plans of old/damaged equipment have to be included.
		• reliability criteria in the MV network (for the planning purposes) per network type:
		  ○ urban, mainly cable network SAIDI 120 min./year, SAIFI 2 inter./year
		  ○ suburban areas and larger settlements SAIDI 240 min./year, SAIFI 4 inter./year
		  ○ rural networks SAIDI 360 min./year, SAIFI 8 inter./year

CY	based on the forecasted flows and voltage conditions	Historical data are taken into account and extrapolated to determine where network development is needed, based on specific applications (e.g. PV production, connection of large consumers) along with the required volumes and capacities. Load forecast is based on the TSO's prediction. System reliability standards are considered. There is a smart meter roll out phase already taking place and planned to cover all consumers This is applicable for the low and medium voltage networks. Further, the DSO plans for the upgrade of equipment used in medium voltage network, based on a study that indicated new technologies to be used in substations, such as RLDC, OTLC, as well as upgrade of voltage lines to 22 kV.
CZ	based on the forecasted flows and voltage conditions	The DNDP planning typically take into account forecasting of demand and expected connections of generation, assessment of network condition based on Preventive Maintenance Plan and supply quality standards, security of supply criteria and investment prioritization.
DK	based on the forecasted flows and voltage conditions	
EE	based on the forecasted flows and voltage conditions	The DNDP planning methodology typically includes: • demand forecasting: estimation of future electricity demand based on historical consumption data, economic growth projections, and expected electrification trends; • assessment of network condition: evaluation of the existing network infrastructure, identifying aging assets and capacity constraints; • integration of renewables: analysis of renewable generation trends and the impact of decentralized energy sources on network stability and capacity; • scenario development: development of scenarios using DSO internal data, complemented by studies commissioned by DSOs or the TSO, typically covering a planning horizon of up to 10 years; • reliability criteria: the planning considering SAIDI and SAIFI targets to minimize outage duration.
FI	based on different analysis and experience and	Security of supply obligations require that there should not be outages longer than 6 hours in cities and outages longer than 36 hours in rural areas due to snow loads or storms. Some DSOs have to meet these obligation by the end of 2028 and most DSOs by the end of 2036.

	How do DSOs determine where are investments needed?	Information on the planning methodology
	knowledge of the DSO's network	
FR[34]		
DE	based on the forecasted flows and voltage conditions and based on DSOs' experience and knowledge of their network	
GR	based on the forecasted flows and voltage conditions	The planning criteria for network reinforcement are mostly based on RES penetration and climate resilience, aligned with NECP targets.
HU	based on the forecasted flows and voltage conditions	The DSO calculates network overloads and based on the results, 'end state' network models are developed. Based on these, alternatives for network development have to be developed in line with scenarios and development policies. Planning criteria: principle of least cost, N-1 principle, guidelines on overload and NECP. Outage duration and number of outages are not considered, as these are included in the quality of supply requirements the network licenses have to comply with.
IT	DSOs are required to publish with their DNDP also methodology leading to identification of planed investments	An updated version of the methodologies are expected in Q2 of 2025. DSOs currently use different parameters for their investment decision, but generally, N security is set at 90% of MV assets loading and N-1 security is considered with different thresholds ranging between 50% and 75% for HV/MV transformers.
LV	based on the forecasted flows and voltage conditions	Development targets are used which include various criteria such as SAIDI, SAIFI, number of faults, number of interruptions resolved over 24 h, etc.
LT	based on the forecasted flows and voltage conditions	The main objective of the DNDP is to ensure uninterrupted, high-quality electricity distribution, smooth connection of new customers and optimal integration of distributed energy sources, and to speed up the restoration of power supply in the event of disruptions. At the same time, the DSO has also set out in its DNDP a reduction in the SAIDI, SAIFI indicators, with an overall reduction in the five-year average, but the DNDP does not set any specific targets for SAIDI, SAIFI indicators. The only commitment of the DSO is to replace the electricity cables underground to improve the SAIDI, SAIFI indicators.
LU	yet unknown because there is no DNDP in the country	The process has not yet been established. The NRA is currently formalising the guiding principles for the establishment of DNDPs.

[34] The French NRA explains the implementing decree has not yet been published.

	How do DSOs determine where are investments needed?	Information on the planning methodology
MT	based on DSOs' experience and knowledge of their network	The main planning objectives addressed by the DNDP are the following: • Maintain N-1 under all operational scenarios; • Address weaknesses in the network at all voltage levels; • Improve network effectiveness indices over time; • Support and facilitate the country's penetration of renewable energy connected to the grid that will permit the attaining of the set decarbonization targets; • Support the country's increasing use of EV's by ensuring that the grid can provide the country's future energy requirements for electric vehicles in daily use.
NL	based on the forecasted flows and voltage conditions	Based on development paths, the demand and supply of electricity and gas in all sub-networks are determined for the next 10 years. In this, it has been assumed that the flexibility present in the network for the purpose of maintaining balance will be connected in a scarcity-neutral manner. Using profiles, this is translated into a specific demand for transport capacity in the sub-networks. By continuously testing this demand for transport capacity for each of the scenarios against the available transport capacity, the capacity bottlenecks per scenario are mapped out. This results in an overview of all capacity bottlenecks, including the year in which they are expected and in which of the scenarios they will occur. The investments involved in resolving capacity and quality bottlenecks, together with the other activities of a grid operator, such as maintenance of the existing grid, form the total work package of the grid operator. In order to be able to schedule the total work package in time, a number of steps must be taken. First, prioritization takes place. The total work package has grown enormously in recent years, as a result of the energy transition. A DSO is currently not yet able to grow its own labour capacity at the same rate. In addition, there are other delaying factors such as material shortages, lack of space and environmental procedures. As a result, not all investments can be made in time and choices must be made with regard to which activities are carried out first and which later. The prioritization framework of the DSO itself, as well as the social prioritization by governments via the provincial and national MIEK (Multi-year Infrastructure Energy & Climate Program) play a role in this. After a preferential order has been determined with these instruments, the projects are scheduled in time. There are a number of pragmatic reasons that can cause the order of the projects to change again. Firstly, this concerns external restrictions such as permit procedures and the dependency on the higher-level grid operators TSOs, which means that certain investments cannot (yet) be made. Secondly, it concerns optimisation of the work package, such as the smart combination of activities, which can also cause shifts. If not all planned activities can be realised on time, prioritisation must be carried out. This prioritisation is carried out in a number of steps. The corporate values of the DSO play an important role in this. The most important corporate values for prioritisation are safety, reliability and grid accessibility. These corporate values are related to the statutory tasks of the grid operator (guaranteeing safety, reliability and ensuring sufficient transport capacity).
PL	based on DSOs' experience and knowledge of their network	DNDP includes analysis of the legal environment, technical/capacity/demand/rcm/network utilization/customer indicators, etc. analyses, analysis of external factor impact scenarios (electromobility, data centres, heating electrification, prosumerism, etc.), establishing an investment plan based on network models for a minimum of 6 years (divided into voltages), taking into account other so-called non-network areas (transport, administration, IT, etc.), merging of substantive scope data and calculation of budgets (use of price lists), transfer of information to forms required by URE, development of a descriptive part (commentary for the tabular part) and a financial plan. Regulation requirements: indicators based on SAIDI and SAIFI, connection completion time, n-1 and n-2, short-circuit calculations, 'Charter for the Effective Transformation of the Distribution Networks of the Polish Powe Industry' (project designed to create a stable regulatory environment for energy companies, necessary for investments in network modernization and development, and to facilitate the raising of investment funds from sources other than tariffs), priority investments;
PT	based on the forecasted flows and voltage conditions	In order to meet the challenges imposed by national scenarios on generation capacity and consumption growth, DSO identifies network needs (including assets management needs) and proposes different investment programmes to achieve those targets. The draft NDP shall include all investments needed within a 5 year timeframe.

	How do DSOs determine where are investments needed?	Information on the planning methodology
		The DSO shall also identify alternatives with flexible solutions that can allow to postpone investments, if economically favourable. The planning criteria includes maximum acceptable amount of outage duration and energy not served, among others.
RO	based on the forecasted flows and voltage conditions	DSOs carry out studies and prospective analyses of the network, in the short term - for the next 5 years, and in the long term - 10 years, regarding the current state and future evolution of electricity consumption; of the structure and capacity of producer sources; of electricity imports and exports, taking into account the forecasts for the development of cross-border exchange capacities, the digitalisation and integration of flexibility services. The electricity networks are analysed according to their age, the technical condition of their elements, the level of service performance according to the indicators provided for in the specific regulations and other criteria. The planning methodology for DNDPs in Romania is guided by specific criteria, conditions, principles, national targets, and regulatory requirements to ensure network reliability, efficiency, and compliance with EU energy policies. DOSs plans DNDPs based on studies and analyses regarding the age and technical condition of the network to determine the investment works needed to improve the technical, qualitative and commercial performance indicators of the network, studies and analyses for the integration of renewable sources, ensuring the reliability and security of the network, digitization and integration of flexibility services, analysis of network operating regimes (including the n-1 criterion), analysis of the evolution of electricity production and consumption.
SK	based on DSOs' experience and knowledge of their network	DSOs plans development in order future development their operational area and requirement for connections of RES. Decree RONI 230/2023 established the content of the distribution system development plan and Decree of RONI 236/2016 established quality standards for electricity transmission, electricity distribution and supply of electricity.
SI	based on the forecasted flows and voltage conditions	The planning methodology and criteria are detailed in the national grid code for distribution system (see https://www.uradni-list.si/glasilo-uradni-list-rs/vsebina/2024-01-2339?sop=2024-01-2339), articles 55-63 and further explained in NDP. The key elements of the electricity distribution network development planning process are: • Establishing a baseline situation; • Forecasting the evolution of consumption, generation and loads over the coming period; • Network simulations, which allow analyses of expected operating conditions, power continuity analyses and economic analyses; • Detecting changes in the behavior of network users and the expected evolution of new factors (distributed generation, heat pumps, electric vehicles, peak load shifts, consumption management and other services brought about by new technologies); • Planning criteria to ensure an adequate quality of electricity supply and represent threshold values, the exceedance of which is prevented in the process of planning the network development through system expansion (reinforcements and extensions of the network) and modern technological approaches and concepts. The criteria for developing a distribution system are technical, economic, environmental, safety and reliability criteria with the main criterion to ensure the reliable operation of the distribution system and to achieve an adequate level of quality of electricity supply at the lowest possible cost to users and with the least possible impact on the environment.
ES	based on the forecasted flows and voltage conditions	The Autonomous Regions are responsible for the DNDPs, the Ministry is responsible for the economic development of those plans and the CNMC has the duty to provide an individual and a global analysis for the whole sector to evaluate the economic impact of these investments in a way that ensures that they don´t disturb the economic sustainability of the electrical system. The electrical system is developed under the single grid principle with the criterion of the lowest possible cost for the whole system. To this end, despite the large number of operators, the development of the grid is organized in accordance with common principles throughout the Spanish territory, which establish the basic

	How do DSOs determine where are investments needed?	Information on the planning methodology
		state regulations, general criteria in the design and operation as well as the coordinated development of the grids. In this way, homogeneous treatment is ensured among the different operators, as well as establishing common conditions that are comparable for all energy users wherever they are located. Regarding the development of DNDPs, the Government has established for the period 2023-2025, DSOs must include in their NDPs actions to increase the capacity of their grids to allow RES evacuation and self-consumption facilities. These actions must account for a minimum of 10% of the investment and must be prioritized in those areas where the lack of access capacity for renewable generation and self-consumption evacuation has become evident on a recurring basis. The proposed investment plan must include an estimate of the increase in access capacity for generation evacuation expected because of the investments contained in the plan.
SE	based on the forecasted flows and voltage conditions (for some DSOs) and based on experience and knowledge of their network (for some DSOs)	Methods that may be helpful in developing the forecast for the need for distribution capacity include risk analysis, sensitivity analysis, and stakeholder dialogue. In Sweden it is not tolerated by the Electricity Act to have outages longer than 24 hours. Ei has been given the right to define additional minimum requirements of quality supply. There are requirements regarding both the frequency and duration of outages and also voltage quality. In short Ei's regulation on quality supply contains: • Maximum number of outages for end-users, thresholds for what is considered good or not good quality. • Outage requirements for loads over 2 MW, stricter requirements on outage durations than the 24 hours in the Swedish Electricity Act. • Tree-safe lines for voltages >25 kV, mandates the protection of power lines against tree interference, enhancing system reliability. • Voltage quality

Table 14: Flexibility in distribution network development plans

	Consideration of flexibility in DNDP	Why do DSOs see flexibility useful?[35]			Voltage granularity	Spatial granularity	Temporal granularity	Directions	The use of CBA	Regulatory incentives for the use of flexibility
		To solve RES-driven congestion	To solve load-driven congestion	To solve voltage issues						
AT	yes (in some DNDPs), but no quantification of needs	x	x		*not applicable as there is no quantification*					no
BE	consideration but no quantification in the Flemish region, no consideration and no quantification in the	x (all)	x (the Brussels and Flemish regions)		*not applicable as there is no quantification (the Wallon region)*					no

[35] The Austrian NRA reports DSOs also see flexibility useful as temporary service during maintenance.

	Consideration of flexibility in DNDP	Why do DSOs see flexibility useful?[35]			Voltage granularity	Spatial granularity	Temporal granularity	Directions	The use of CBA	Regulatory incentives for the use of flexibility
		To solve RES-driven congestion	To solve load-driven congestion	To solve voltage issues						
	Brussels and Walloon regions									
BG	under consideration	under consideration			*not applicable as there is no DNDP yet*					no
HR	yes, but no quantification of needs	x	x	x	*not applicable as there is no quantification*					no
CY[36]	no									no
CZ	planned to be considered in DNDPs			x	yet unclear					no
DK	yes, quantification of needs in terms of power and energy (for some DNDPs)	x	x	x	per voltage level (some DNDPs) and aggregated (some DNDPs)	an aggregated value for the whole DSO area	one value per year	Upward and downward	yes (for some DNDPs)	DSOs can receive compensation for operational costs related to flexibility services. The incentive is that it should be a neutral choice to either invest in OPEX or CAPEX.
EE	yes, but no quantification of needs	x		x	*not applicable as there is no quantification*					no
FI	yes, but no quantification of needs	x	x	x	*not applicable as there is no quantification*					There is a small regulatory incentive in place for DSOs (also for TSO) to develop the flexibility market from 2024 onwards, and from 2028 onwards network operators are incentivized to use and procure flexibility in a purely market-based manner.

[36] The Cypriot NRA reports the information is currently not available, but publication of the regulatory decision for DSO to procure flexibility needs is planned.

	Consideration of flexibility in DNDP	Why do DSOs see flexibility useful?[35]			Voltage granularity	Spatial granularity	Temporal granularity	Directions	The use of CBA	Regulatory incentives for the use of flexibility
		To solve RES-driven congestion	To solve load-driven congestion	To solve voltage issues						
FR[37]		x	x							priority project to be implemented with a deadline mainly for flexible connection, DSO/TSO coordination; economic incentive to use flexibility (OPEX) vs investment (CAPEX)
DE[38]	yes (for some DNDPs), generally no quantification of needs	x	x		*not applicable as there is no quantification*					no
GR	no	x			*not applicable as flexibility is not considered*					no
HU	yes, but no quantification of needs	x	x	x	*not applicable as there is no quantification*					no
IT	pilot projects currently being carried out, a legal requirement to identify the need for flexibility to be implemented in 2025 DNDPs				no					
LV	no	x	x	x	no					
LT	yes, but no quantification of needs				*not applicable as there is no quantification*					no

[37] The French NRA explains the implementing decree has not yet been published.

[38] The German NRA explains the next years will be challenging in terms of integrating huge number of heat pumps and electric vehicles into the low voltage grid. For this reason, the DSOs were given the right to control these devices, if there's a congestion in the grid. As a reward the costumers get a discount on their grid fee.
To handle the access to the grid of the huge number of renewable generation units, we established the instrument of flexible connection agreement based. DSO can offer a quick access to grids, even if there is not much capacity left, because they are allowed to control the units in the agreed situations/time slots.

	Consideration of flexibility in DNDP	Why do DSOs see flexibility useful?[35]			Voltage granularity	Spatial granularity	Temporal granularity	Directions	The use of CBA	Regulatory incentives for the use of flexibility
		To solve RES-driven congestion	To solve load-driven congestion	To solve voltage issues						
LU	a legal requirement to identify the need for flexibility, but no DNDP yet				*not applicable as there is no DNDP yet*					There is an incentive benefit depending on the number of flexible connection agreements on top of the maximum allowed revenue.
MT	no	x	x	x	No					
NL	yes, but no quantification of needs	x	x		*not applicable as there is no quantification*					no
PL	yes, but no quantification of needs	x	x	x	*not applicable as there is no quantification*					no[39]
PT	yes, quantification of needs in term of power and energy based on load flow and statistical analysis of forecasts	x	x	x	per voltage level	per geographical regions	information on representative time-block provided (e.g. hours in a day)	upward and downward	yes	no
RO	yes, but no quantification of needs	x	x		*not applicable as there is no quantification*					The costs of DSOs to purchase flexibility services are fully recognized, without any efficiency target, although there are controllable costs.
SK	yes, but no quantification of needs			x	*not applicable as there is no quantification*					no

[39] The Polish NRA explains although the legal provisions defining flexibility services have been introduced, there are still some pending amendments of secondary legislation, which purpose is to streamline the development of flexibility services. The changes of national transmission grid code, which relates to the coordination of use of flexibility services with DSOs are now under regulatory administrative procedure.

	Consideration of flexibility in DNDP	Why do DSOs see flexibility useful?[35]			Voltage granularity	Spatial granularity	Temporal granularity	Directions	The use of CBA	Regulatory incentives for the use of flexibility
		To solve RES-driven congestion	To solve load-driven congestion	To solve voltage issues						
SI	yes, quantification of needs in terms of power	x	x	x	aggregated for all voltage levels	aggregated for the whole DSO area	one value per year	upward and downward	no[40]	The NRA recognises within the eligible costs the costs incurred by the DSO to cover the provision of flexibility services. Methodology is described in the "Act on the methodology for setting the regulatory framework for electricity operators" (https://pisrs.si/pregledNpb?idPredpisa=AKT_1280&idPredpisaChng=ANJP34). Besides, within the same methodology, the output-based incentive regulation has been introduced on the project and system level incentivizing the use of flexibility.
ES	no[41]				no					
SE	yes, quantification of needs in terms of power (for some DNDPs) with the method up to the DSO	x	x	x	aggregated for all voltage levels	aggregated for the whole DSO area (for some DNDPs) and per geographical regions (for some DNDPs)	provided for 0-2, 3-5 and 6-10 years	one direction for most DNDPs and both directions for few DNDPs	yes (for some DNDPs)	For the next regulatory period, the NRA would like to introduce efficiency requirements considering TOTEX. According to the current revenue cap regulation, the DSOs get full cost recovery for their flexibility costs. Furthermore, the NRA has a load flow incentive that indirectly incentivises utilisation of flexibility. The aim of this incentivise is to even out the load, so it indirectly incentivises the use of flexibility services and measures, e.g. load control and capacity tariffs.

[40] The Slovenian NRA explains NDP used the analysis from the pilot project on a limited part of the system an generalised it to the entire distribution system. The NRA formally requested an improvement of the method.

[41] The Spanish NRA explains the provisions relevant to Article 32 of the Electricity Directive have not yet been transposed into the national legislation

Table 15: Project categories in distribution network development plans

Project categories[42]	
SCADA, digital twins, cybersecurity, information and communication technologies and other non-copper infrastructure	the Brussels and Flemish regions in BE, CY, HR, DK, GR, IT, LV, LT, MT, NL, PL, PT, RO, SI, ES
Energy storage facilities operated by DSOs	DK, PL, ES
Smart grid	the Flemish region in BE, CY, HR, DK, FI, GR, LV, LT, PL, PT, RO, SI, ES
Reactive power compensation devices	CY, HR, DK, IT, PL, PT, SI, ES
Other	GR (new control centers), MT (new centres and control rooms), SI (other assets needed for the activities of the DSO, e.g. building, vehicles, …)

Table 16: Precision of project-related data based on voltage levels

Level of granularity of project-related data[43]	High voltage level[44]	Medium voltage level	Low voltage level
Listed and specified in details	AT, BE, HR, DK, DE, HU, IT, MT, PL, PT, RO, SK, SI, ES	BE, DK, EE, DE, IT, MT, NL, PL, PT, ES, SE (some DSOs)	-

[42] The French NRA explains the implementing decree has not yet been published.

[43] In Denmark, DSOs report its planned investments in the main distribution infrastructure required to connect new generation capacity and new consumption or existing generation capacity and consumption that has been expanded. It is up to the DSO to determine which type of projects are considered main infrastructure. Each project that the DSO identifies as main distribution infrastructure shall be included in the DNDP and for each project the following data should be included: code, description, purpose, status and commissioning date.
The French NRA explains the implementing decree has not yet been published.
In Latvia, large investment projects are specified in details according to investment plan rules and voltage is not criteria.
The Swedish NRA explains the DSO shall report its planned investments in the main distribution infrastructure required to connect new generation capacity and consumption or existing generation capacity and consumption that has been expanded. It is up to the DSO to determine which type of projects that are considered main distribution infrastructure. In Sweden, low voltage projects are typically not included in DNDPs (with an exception of some DNDPs).

[44] The Swedish NRA explains that projects can be included in the DNDP either in detail or as aggregates.

Level of granularity of project-related data[43]	High voltage level[44]	Medium voltage level	Low voltage level
Provided in an aggregated way	FI, LT	AT, CY[46], FI, GR, LV, LT, RO, SK, SI, SE (some DSOs)	AT, BE, CY[45], DK, EE, FI, DE, GR, IT, LT, MT, NL, PL, RO, SK, SI, ES

Table 17: Project-specific information in distribution network development plans

	Project-specific information in DNDPs									Project-related information provided in a worksheet format?
	Description	Technical characteristics (e.g. length, capacity etc)	ID number or code of the project	Costs	Benefits	Status describing maturity	Expected commissioning date	Progress compared to the previous DNDP or compared to the expected implementation plan	Reasons for potential delay or rescheduling of the project	
AT	x	x	x			x	x			no
BE[46]	x	x	x (the Flemish and Walloon regions)	x (the Brussels and Walloon regions)		x (the Brussels and Flemish regions)	x	x	x	yes (the Flemish and Walloon regions)
BG	not applicable because there is no DNDP yet									
HR	x	x	x	x	x	x	x	x	x	yes
CY										no
CZ	not yet applicable									
DK	x	x	x	x	x	x	x	x	n	yes
EE	x	x	x	x	x		x			yes

[45] As there is an increased number of projects, the DSO aggregates the projects by application (e.g. PV production, connection of large consumer) volume and capacity.

[46] For the Walloon Region, the DNDP is composed of two parts – high level description with explanation on specific significant projects and exhaustive data per project provided in a worksheet format. For the Brussels region, for each of the next 5 years, information is provided by category of asset and with details on the investment drivers.

	Project-specific information in DNDPs									Project-related information provided in a worksheet format?
	Description	Technical characteristics (e.g. length, capacity etc)	ID number or code of the project	Costs	Benefits	Status describing maturity	Expected commissioning date	Progress compared to the previous DNDP or compared to the expected implementation plan	Reasons for potential delay or rescheduling of the project	
FI[47]	Not applicable because DNDP does not list individual projects.									no
FR[48]										
DE[49]	x	x		x		x				yes
GR	Not applicable because DNDP does not list individual projects. Aggregation is provided for network reinforcement, replacement and renovation, user connections, IT projects (there are also some projects for which the costs are provided separately.)									yes
HU	x						x			no
IT	x		x	x		x	x	x	x	yes
LV										yes
LT	Not applicable because DNDP does not list individual projects.									yes
LU	Not applicable because there is no DNDP yet.									
MT[50]	x	x			x	x	x			no

[47] The Finish NRA explains the long-term plan (investments and maintenance) for meeting the security of supply obligations and to maintain network capacity is collected for three different time frames: 2014-2021, 2022-2028, 2029-2036. All time frames have 5 categories: high voltage network, primary substations, medium voltage network, secondary substations and low voltage network. Additional information is collected such as how many customers are already and in the future (certain years are mandatory) in network that meets the security of supply obligations and some network KPIs for those same years. Investments for new loads and production is collected for the next 0-5 years and next 6-10 years and a description on what kind of investments these include. Same information in the same categories is collected also for the next 2 years. Including description what kind of development actions the DSO is going to do and similar KPIs as the long-term plan.

[48] The French NRA explains the implementing decree has not yet been published.

[49] The German NRA explains information is provided in table form.

[50] Each HV and MV project is listed and described in a narrative format rather than tables. As a result, not all information is available for every project.

	Project-specific information in DNDPs									Project-related information provided in a worksheet format?
	Description	Technical characteristics (e.g. length, capacity etc)	ID number or code of the project	Costs	Benefits	Status describing maturity	Expected commissioning date	Progress compared to the previous DNDP or compared to the expected implementation plan	Reasons for potential delay or rescheduling of the project	
NL[51]	x	x	x	x		x	x	x	x	no
PL	x		x			x	x	x	x	yes
PT	x	x	x	x	x		x	x	x	yes
RO[52]				x	x		x		x	yes
SK	x	x		x		x	x			no
SI	x	x	x	x			x	x	x	no
ES	x	x	x	x			x	x		yes
SE	x	x	x			x	x	[53]		no

Table 18: Challenges of the regulators and distribution system operators as regards the distribution network planning

	NRA challenges	DSO challenges
AT	amount of information provided to the NRA, harmonisation of TSO and DSO input data considering spatial planning and political requirements, finding the balance between top-down and bottom-up planning, possibility of information being shared by public delaying permitting;	supply chain issues, lack of skilled workforce, permitting-related issues, delayed TSO projects (TSO-DSO grid hosting capacity), static technical requirements (e.g. voltage bands, no consideration of probability for RES generation etc;

[51] The Dutch NRA explains The NDP distinguishes between regular and major bottlenecks. Bottlenecks in the electricity grids with a voltage of 25 kV or more are considered major bottlenecks and are named individually. All other bottlenecks in the lower grid levels concern regular bottlenecks and are described at an aggregated level.

[52] The Romanian NRA explains investment projects are classified by category of works, voltage level, area.

[53] The Swedish NRA explains the DSOs shall follow up specified projects in the DNDP in future DNDPs regarding project's status, physical adjustments (e.g. geographical location, technology used, or capacity), and forecasted cost developments.

	NRA challenges	DSO challenges
BE	the Brussels region: having a fit-for purpose DNDP that accommodates new usage especially anticipating expected acceleration of photovoltaics and massive adoption of electric vehicles, and possibly heat pumps deployment, while maximising the use of existing capacity (development of smart grids in process including new tools for grid congestion forecasting and building up credible scenarios, planned regulatory framework changes including tariffs, technical regulation…); the Flemish region: challenges related to translation of assumptions to concrete capacity requirements in different network areas and transparency of the related information (more detailed information requested from the DSOs), uncertainties regarding impact and speed of the energy transition on the low and medium voltage grids; the Walloon region: uncertainty regarding evolution of user behaviour making it difficult to determine if the DNDP is fit for future;	the Brussels region: having a fit-for purpose DNDP that accommodates new usage especially anticipating expected acceleration of photovoltaics and massive adoption of electric vehicles and possibly heat pumps deployment while maximising the use of existing capacity (development of smart grids in process including new tools for grid congestion forecasting and building up credible scenarios, planned regulatory framework changes including tariffs, technical regulation…); the Flemish region: challenges related to translation of assumptions to concrete capacity requirements in different network areas, uncertainties regarding impact and speed of the energy transition on the low and medium voltage grids, supply chain issues, permitting issues; the Walloon region: delays in permitting and public tenders (DSOs and NRAs communicate the permitting issues to policymakers), issues related to supply chains (plan is to move from 'just in time' supply chain to a 'buffer stock' policy), lack of predictable market trends depending on politics and geopolitics despite the long-term targets being set;
HR		delays in permitting and public tenders, issues related to supply chains;
CZ	creation of a harmonized structure for DNDP in accordance with the regulation (currently under preparation), assessment of DNDPs in terms of transparency and investment efficiency;	
CY	ensuring accommodation of increased PV production load and EV charging stations, an emerging need to upgrade the system to 22 kV;	delays of permitting by other public authorities, increased volume of connection requests and increased needs for system expansion and upgrade;
DK		lack of skilled workforce to create a DNDP to an acceptable degree of quality (some DSOs use external consultant companies to elaborate their DNDP);
EE	an often submission of unclear, inconsistent or incomplete DNDPs, leading to continuous revisions and amendments, significantly complicating the review and approval process;	securing adequate access to financial resources (discussions planned with the government to seek solutions, exploring opportunities for enhanced funding mechanisms, regulatory adjustments or financial support measures);
FI	complex and challenging evaluation of DNDP development actions and of their cost-efficiency, considering large variety of DSO sizes (small with e.g. 1000 customers) and a requirement for all 77 to develop a DNDP in line with the national requirements;	rapid increase of distributed resources and electrification, the use of flexibility as an alternative for network expansion;

	NRA challenges	DSO challenges
DE	large number of DNDPs from DSOs including the need to consider concerns of smaller DSOs;	lengthy approval process (processes are being simplified, government currently trying to reduce bureaucracy), issues regarding available land or property right or compliance with species protection regulations, lack of skilled workers, difficulties related to long-term predictions for 5- and 10-years and until 2045;
GR	higher actual costs than DNDP-approved estimates leading to an unforeseen increase in the allowed revenue and tariffs, closer monitoring of the implementation of the approved DNDPs;	staying on track with the smart meter rollout implementation project, difficulties related to accurate estimations of the economic activity, new connection requests and the need for upgrades, renovation or reinforcements, leading to underestimations differing significantly from the actual project costs;
HU	lack of expertise and to review calculations and modelling, lack of data from lower voltage levels and challenges related to analysis of such data, difficulties related to assessing flexibility alternatives;	access to financing, slow permitting process, lack of skilled workforce, dealing with planned outages;
IT	lack of DSO willingness and capacity to deal with an advanced network planning, limited NRA resources;	lack of a structured approach to distribution network development planning (until recently) combined with the impacts of the energy transition, especially new generation and asset price crisis (several DSOs creating recently new teams to deal with network planning, NRA requiring common DNDP deliverables and its promotion to working in groups to cope with these new topics and deliverables), limited possibilities for investments mainly due to investment allocation within the utility owning the DSO;
LV	alignment of planned investments of DSOs and TSOs;	insufficient acquisition of the European funds, delays is project delivery, increased investment costs in the face of price volatility;
LT	rising cost of materials and works making it difficult to meet approved investment budgets;	replacement of overhead lines with cables, thin logging sites in forest areas to avoid potential outages and to avoid significant increase in investment needs (additional funding planned to address this);
LU	no experience yet with DNDPs, (NRA's guidance paper state the level of ambition to be achieved, aiming for the same quality of planning for TSOs and DSOs), difficulties related to availability and reporting and controlling data, difficulties related to different project granularity, CBA framework and no reference unit costs for distribution level, challenges related to benchmarking possibilities;	no experience yet with DNDPs, difficulties related to availability of data and reporting, difficulties related to planning and forecasting works in coordination with other operators (e.g. telecom, water, urbanism), permitting-related issues, supply chain issues (time until delivery or availability), supply chain price pressure and volatility;
MT	lack of guidance regarding the DNDP structure;	voltage fluctuation issues, increased stress on the distribution network (rise in population density, development of electric vehicles charging infrastructure, increase of intensity, frequency and duration of heat waves);
NL	investigation of whether the proposed investments are indeed the most efficient (a more comprehensive framework between DNDPs and efficient cost reimbursement method being put in place);	lack of skilled workforce, delays in permitting, issues related to supply chains, uncertainty of the near future, inconsistent occurrence of the energy transition with periods of progress and setbacks;

	NRA challenges	DSO challenges
PL	limitations resulting from connections of prosumers and RES;	legal barriers, difficulties related to permitting and consents, difficulties related to obtain donations and loans, rising prices, difficulties with coordinating investments with companies from industries, supply chain issue;
PT	tight timeframe to analyse draft DNDP and prepare the public consultation;	delays in permitting and issues related to supply chains;
RO	growing need for investments and accommodation in network tariffs of the costs related to these investments, resulting from aging infrastructure, integration of RES, investment constrains, legislative changes, evolution of consumption, the need for digitalisation networks and activities of DSOs as well as the capacity of network operators to comply with all requirements (the NRA focusing on accelerating digitalisation, improving grid capacity, supporting RES integration, providing incentives, ensuring regulatory stability and continuous collaboration with DSOs, stakeholders, public authorities and consumers);	complex and slow permitting process with approval from local authorities and environmental agencies leading to delays, issues related to the supply chain for critical equipment (TR, cables, switchgear, meters) due to global supply chain disruptions, rising costs and scarcity of raw material (copper, aluminium), compliance with EU Clean Energy Package and national decarbonisation targets requiring significant adaptations (e.g. RES integration), new obligations related to smart grids, digitalisation and cybersecurity resulting in additional investment and technical expertise, increasing connection requests (e,g, RES), electric vehicles charging stations causing congestions and voltage issues in some areas, a need to invest in reinforcement and flexibility solutions with project timelines often constrained by permitting and funding issues;
SI	assessment of potential of flexibility resources in the distribution system not being based on a comprehensive analysis, insufficient transparency in the delineation of investments in new innovative technologies (e.g. smart grids), challenges related to the definition of key performance indicators (NRA's proposal of proactive engagement of the DSO with the NRA during the initiation phase of activities for the preparation of the next DNDP);	delays in permitting, price increase for materials and services, access to financial resources, lack of human resources, increasingly complex and challenging planning of distribution network development in terms of connecting distributed generation, electrification of heating and transport, lack of data behind the metering points;
ES	establishment of remuneration mechanisms that combine adequate and sufficient returns on investment in term of the economic sustainability, are sufficient to develop the networks needed to meet the challenges in the medium and long term, and efficient in terms of costs incurred and in terms of transferring the benefits to end users;	
SE	many legal disputes, lack of resources to implement EU legislation, uncertainty related to the speed of electrification;	delays in permitting and issues related to the supply chains, uncertainty related to the speed of electrification;